

What is claimed is:

1. A method to produce water soluble carbohydrates from cellulose contained within, a lignocellulose which comprises:
providing a lignocellulose, and
providing a membrane to divide a filtrate containing enzymes, and
providing enzymes, recycled from said membrane, to said lignocellulose containing cellulose, and
combining extractate, from a previous extraction, containing water soluble carbohydrates and enzymes, with cellulose contained within lignocellulose, and
hydrolyzing cellulose, contained within lignocellulose, combined with enzymes recycled from said membrane and extractate,
at a pH of about 5, to create water soluble carbohydrates and to produce a lignin residue containing water soluble carbohydrates and enzymes, and
removing said residue containing lignins from hydrolysis and filtering said residue containing lignins to produce a filtrate and a filtered residue, and
extracting the filtered residue containing lignins with water to substantially extract water soluble carbohydrates and enzymes from the residue to produce a water extracted residue and an extractate for recycle for additional hydrolysis, and
employing said membrane to substantially divide said filtrate containing water soluble carbohydrates and enzymes to provide water soluble carbohydrates substantially devoid of enzymes and provide recycled enzymes for hydrolysis of cellulose contained in lignocellulose thereby water soluble carbohydrates substantially devoid of enzymes are derived from lignocellulose and a residue containing lignins substantially devoid of water soluble carbohydrates and enzymes is the result of extraction to produce an extractate containing enzymes for recycle for additional hydrolysis.
2. The method of claim 1 wherein said hydrolysis is accomplished in a vessel.
3. The method of claim 1 wherein said filtrate is subjected to ultrafiltration to substantially separate enzymes from the water soluble carbohydrates and form a solution substantially devoid of enzymes and recycle the separated enzymes for subsequent hydrolysis of cellulose contained in a lignocellulose.
4. The method of claim 3 wherein the, solution containing water soluble carbohydrates, is subjected to hydrolysis and fermentation to form ethanol.
5. The method of claim 1 wherein said lignocellulose is obtained from biomass selected from the group consisting of wood, waste paper and municipal solid waste.

- 6 The method of claim 1 wherein said lignocellulose is provided from dilute acid hydrolysis of a biomass to provide a lignocellulose substantially devoid of hemicellulose.
7. The method of claim 1 wherein enzymes are selected from the group consisting of cellulase, glucanhydrolase and, cellobiohydrolase.
8. The method of claim 1 wherein said lignocellulose containing cellulose is accessible to enzymes.
9. The method of claim 1 wherein said extractate contains water soluble carbohydrates.
10. The method of claim 1 wherein water soluble carbohydrates, derived by hydrolysis of cellulose within lignocellulose, contain glucose.
11. The method of claim 1 wherein water soluble carbohydrates, derived by hydrolysis of cellulose within lignocellulose, contain glucose polymers.
12. The method of claim 1 wherein water soluble carbohydrates, derived by hydrolysis of cellulose within lignocellulose, contain cellodextrins.
13. The method of claim 1 wherein enzymes derived from ultrafiltration are recycled to provide enzymes for hydrolysis of cellulose contained in a lignocellulose.
14. The method of claim 1 wherein water soluble carbohydrates, derived by hydrolysis of cellulose within lignocellulose containing enzymes are absorbed by cellulose to provide absorbed enzymes for hydrolysis of cellulose contained in a lignocellulose.
15. The method of claim 1 wherein water soluble carbohydrates, derived by hydrolysis of cellulose within lignocellulose, are subjected to further hydrolysis to form glucose.
16. The method of claim 1 wherein said method is continuous.
17. The method of claim 1 wherein said lignocellulose is obtained from pretreated biomass.
18. The method of claim 1 wherein said lignocellulose is substantially devoid of hemicellulose.
19. The method of claim 1 wherein said lignocellulose is substantially sterilized.